

Abstract

The invention provides gene constructs comprising a nucleotide sequence(s) encoding an antibody, antibodies, or part(s) thereof, that specifically bind to structural or non structural proteins of a pathogen(s). The invention also provides a nucleotide sequence(s) encoding a peptide, or a protein(s), or enzymes that are detrimental or toxic to the said pathogen(s). The invention provides the means and methods for the *in vivo* assembly of two or more proteins, encoded by separate nucleotide sequences, into a protein complex. These antibodies, toxins or complexes may be expressed and targeted to cellular membranes or plant cell compartments in different orientations and also can be cleaved *in vivo* by different proteases to become active. These agents are named "molecular pathogenicides." The means and methods are provided for immobilizing a recombinant protein capable of binding a pathogen, by recombinant DNA techniques. The means and methods are also provided for expressing molecular pathogenicides in membranes of monocotyledonous or dicotyledonous plants. If the pathogen is a virus, then the antibody may be specific to viral structural or non-structural proteins involved in viral entry, disassembly, replication, movement and/or transmission. Also provided are recombinant nucleic acid sequences encoding molecular pathogenicides, vectors, transformed plant suspension and callus cells as well as regenerated transgenic plants expressing "molecular pathogenicides" immobilised in their membrane(s) either directly or upon *in vivo* assembly of two or more independent polypeptide chains.

Also provided are expression systems and genetically engineered pathogen-resistant plants stably transformed with these systems, as well as molecular pathogenicides encoded by the gene constructs and organisms expressing the molecular pathogenicides. Furthermore, kits comprising the aforementioned fusion proteins, pathogenicides, polynucleotides and vectors are provided.